

Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

ATG Met	ATT Ile	GAA Glu	GAC Asp	CCT Pro 5	ATG Met	GAC Asp	TGG Trp	GCT Ala	TTT Phe 10	CCG Pro	AGG Arg	ATA Ile	AAG Lys	AGA Arg 15	CTG Leu	48
CCT Pro	CAG Gln	TAT Tyr	GTC Val 20	TTC Phe	TCT Ser	CTC Leu	GTT Val	AAC Asn 25	GAA Glu	CTC Leu	AAG Lys	TAC Tyr	AAG Lys 30	CTA Leu	AGG Arg	96
CGT Arg	GAA Glu	GGC Gly 35	GAA Glu	GAT Asp	GTA Val	GTG Val	GAT Asp 40	CTT Leu	GGT Gly	ATG Met	GGC Gly	AAT Asn 45	CCT Pro	AAC Asn	ATG Met	144
CCT Pro	CCA Pro 50	GCA Ala	AAG Lys	CAC His	ATA Ile	ATA Ile 55	GAT Asp	AAA Lys	CTC Leu	TGC Cys	GAA Glu 60	GTG Val	GCT Ala	CAA Gln	AAG Lys	192
CCG Pro 65	AAC Asn	GTT Val	CAC His	GGA Gly	TAT Tyr 70	TCT Ser	GCG Ala	TCA Ser	AGG Arg	GGC Gly 75	ATA Ile	CCA Pro	AGA Arg	CTG Leu	AGA Arg 80	240
AAG Lys	GCT Ala	ATA Ile	TGT Cys	AAC Asn 85	TTC Phe	TAC Tyr	GAA Glu	GAA Glu	AGG Arg 90	TAC Tyr	GGA Gly	GTG Val	AAA Lys	CTC Leu 95	GAC Asp	288
CCT Pro	GAG Glu	AGG Arg	GAG Glu 100	GCT Ala	ATA Ile	CTA Leu	ACA Thr	ATC Ile 105	GGT Gly	GCA Ala	AAG Lys	GAA Glu	GGG Gly 110	TAT Tyr	TCT Ser	336
CAT His	TTG Leu	ATG Met 115	CTT Leu	GCG Ala	ATG Met	ATA Ile	TCT Ser 120	CCG Pro	GGT Gly	GAT Asp	ACG Thr	GTA Val 125	ATA Ile	GTT Val	CCT Pro	384
AAT Asn 130	CCC Pro	ACC Thr	TAT Tyr	CCT Pro	ATT Ile	CAC His 135	TAT Tyr	TAC Tyr	GCT Ala	CCC Pro	ATA Ile 140	ATT Ile	GCA Ala	GGA Gly	GGG Gly	432
GAA Glu 145	GTT Val	CAC His	TCA Ser	ATA Ile	CCC Pro 150	CTT Leu	AAC Asn	TTC Phe	TCG Ser	GAC Asp 155	GAT Asp	CAA Gln	GAT Asp	CAT His	CAG Gln 160	480
GAA Glu	GAG Glu	TTT Phe	TTA Leu	AGG Arg 165	AGG Arg	CTT Leu	TAC Tyr	GAG Glu	ATA Ile 170	GTA Val	AAA Lys	ACC Thr	GCG Ala	ATG Met 175	CCA Pro	528
AAA Lys	CCC Pro	AAG Lys	GCT Ala 180	GTC Val	GTC Val	ATA Ile	AGC Ser	TTT Phe 185	CCT Pro	CAC His	AAT Asn	CCA Pro	ACG Thr 190	ACC Thr	ATA Ile	576
ACG Thr	GTA Val	GAA Glu 195	AAG Lys	GAC Asp	TTT Phe	TTT Phe	AAA Lys 200	GAA Glu	ATA Ile	GTT Val	AAG Lys	TTT Phe 205	GCA Ala	AAG Lys	GAA Glu	624
CAC His	GGT Gly 210	CTC Leu	TGG Trp	ATA Ile	ATA Ile	CAC His 215	GAT Asp	TTT Phe	GCG Ala	TAT Tyr	GCG Ala 220	GAT Asp	ATA Ile	GCC Ala	TTT Phe	672
GAC Asp 225	GGT Gly	TAC Tyr	AAG Lys	CCC Pro	CCC Pro 230	TCA Ser	ATA Ile	CTC Leu	GAA Glu	ATA Ile 235	GAA Glu	GGT Gly	GCT Ala	AAA Lys	GAC Asp 240	720

GTT GCG GTT GAG CTC TAC TCC ATG TCA AAG GGC TTT TCA ATG GCG GGC Val Ala Val Glu Leu Tyr Ser Met Ser Lys Gly Phe Ser Met Ala Gly 245 250 255	768
TGG AGG GTA GCC TTT GTC GTT GGA AAC GAA ATA CTC ATA AAA AAC CTT Trp Arg Val Ala Phe Val Val Gly Asn Glu Ile Leu Ile Lys Asn Leu 260 265 270	816
GCA CAC CTC AAA AGC TAC TTG GAT TAC GGT ATA TTT ACT CCC ATA CAG Ala His Leu Lys Ser Tyr Leu Asp Tyr Gly Ile Phe Thr Pro Ile Gln 275 280 285	864
GTG GCC TCT ATT ATC GCA TTA GAG AGC CCC TAC GAA ATC GTG GAA AAA Val Ala Ser Ile Ile Ala Leu Glu Ser Pro Tyr Glu Ile Val Glu Lys 290 295 300	912
ACC GCA AAG GTT TAC CAA AAA AGA AGA GAC GTT CTG GTG GAA GGG TTA Thr Ala Lys Val Tyr Gln Lys Arg Arg Asp Val Leu Val Glu Gly Leu 305 310 315 320	960
AAC AGG CTC GGC TGG AAA GTA AAA AAA CCT AAG GCT ACC ATG TTC GTC Asn Arg Leu Gly Trp Lys Val Lys Lys Pro Lys Ala Thr Met Phe Val 325 330 335	1008
TGG GCA AAG ATT CCC GAA TGG ATA AAT ATG AAC TCT CTG GAC TTT TCC Trp Ala Lys Ile Pro Glu Trp Ile Asn Met Asn Ser Leu Asp Phe Ser 340 345 350	1056
TTG TTC CTC CTA AAA GAG GCG AAG GTT GCG GTA TCC CCG GGT GTG GGC Leu Phe Leu Leu Lys Glu Ala Lys Val Ala Val Ser Pro Gly Val Gly 355 360 365	1104
TTT GGT CAG TAC GGA GAG GGG TAC GTA AGG TTT GCA CTT GTA GAA AAT Phe Gly Gln Tyr Gly Glu Gly Tyr Val Arg Phe Ala Leu Val Glu Asn 370 375 380	1152
GAA CAC AGG ATC AGA CAG GCT ATA AGG GGA ATA AGG AAA GCC TTC AGA Glu His Arg Ile Arg Gln Ala Ile Arg Gly Ile Arg Lys Ala Phe Arg 385 390 395 400	1200
AAA CTC CAG AAG GAG AGG AAA CTT GAA CCT GAG AGA AGT GCT TAA Lys Leu Gln Lys Glu Arg Lys Leu Glu Pro Glu Arg Ser Ala End 405 410 414	1245

FIGURE 2

ATG GAC AGG CTT GAA AAA GTA TCA CCC TTC ATA GTA ATG GAT ATC CTA	48
Met Asp Arg Leu Glu Lys Val Ser Pro Phe Ile Val Met Asp Ile Leu	
5 10 15	
GCT CAG GCC CAG AAG TAC GAA GAC GTA GTA CAC ATG GAG ATA GGA GAG	96
Ala Gln Ala Gln Lys Tyr Glu Asp Val Val His Met Glu Ile Gly Glu	
20 25 30	
CCC GAT TTA GAA CCG TCT CCC AAG GTA ATG GAA GCT CTG GAA CGT GCG	144
Pro Asp Leu Glu Pro Ser Pro Lys Val Met Glu Ala Leu Glu Arg Ala	
35 40 45	
GTG AAG GAA AAG ACG TTC TTC TAC ACC CCT GCT CTG GGA CTC TGG GAA	192
Val Lys Glu Lys Thr Phe Phe Tyr Thr Pro Ala Leu Gly Leu Trp Glu	
50 55 60	
CTC AGG GAA AGG ATA TCG GAG TTT TAC AGG AAA AAG TAC AGC GTT GAA	240
Leu Arg Glu Arg Ile Ser Glu Phe Tyr Arg Lys Lys Tyr Ser Val Glu	
65 70 75 80	
GTT TCT CCA GAG AGA GTC ATC GTA ACT ACC GGA ACT TCG GGA GCG TTT	288
Val Ser Pro Glu Arg Val Ile Val Thr Thr Gly Thr Ser Gly Ala Phe	
85 90 95	
CTC GTA GCC TAC GCC GTA ACA CTA AAT GCG GGA GAG AAG ATA ATC CTC	336
Leu Val Ala Tyr Ala Val Thr Leu Asn Ala Gly Glu Lys Ile Ile Leu	
100 105 110	
CCA GAC CCC TCT TAC CCC TGT TAC AAA AAC TTT GCC TAC CTC TTA GAC	384
Pro Asp Pro Ser Tyr Pro Cys Tyr Lys Asn Phe Ala Tyr Leu Leu Asp	
115 120 125	
GCT CAG CCG GTT TTC GTA AAC GTT GAC AAG GAA ACG AAT TAC GAA GTA	432
Ala Gln Pro Val Phe Val Asn Val Asp Lys Glu Thr Asn Tyr Glu Val	
130 135 140	
AGG AAA GAG ATG ATA GAA GAC ATT GAT GCG AAA GCC CTT CAC ATT TCC	480
Arg Lys Glu Met Ile Glu Asp Ile Asp Ala Lys Ala Leu His Ile Ser	
145 150 155 160	
TCG CCT CAA AAC CCT ACG GGC ACA CTC TAC TCA CCT GAA ACC CTG AAG	528
Ser Pro Gln Asn Pro Thr Gly Thr Leu Tyr Ser Pro Glu Thr Leu Lys	
165 170 175	
GAA CTT GCG GAG TAC TGC GAA GAG AAG GGT ATG TAC TTC ATA TCC GAC	576
Glu Leu Ala Glu Tyr Cys Glu Glu Lys Gly Met Tyr Phe Ile Ser Asp	
180 185 190	
GAG ATT TAC CAC GGA CTC GTT TAC GAA GGT AGG GAG CAC ACA GCA CTT	624
Glu Ile Tyr His Gly Leu Val Tyr Glu Gly Arg Glu His Thr Ala Leu	
195 200 205	
GAG TTC TCT GAC AGG GCT ATT GTC ATA AAC GGG TTT TCT AAG TAC TTC	672
Glu Phe Ser Asp Arg Ala Ile Val Ile Asn Gly Phe Ser Lys Tyr Phe	
210 215 220	
TGT ATG CCA GGT TTC AGG ATA GGG TGG ATG ATA GTT CCG GAA GAA CTC	720
Cys Met Pro Gly Phe Arg Ile Gly Trp Met Ile Val Pro Glu Glu Leu	
225 230 235 240	

GTG AGA AAG GCG GAA ATA GTA ATT CAG AAC GTA TTT ATA TCT GCC CCG	768
Val Arg Lys Ala Glu Ile Val Ile Gln Asn Val Phe Ile Ser Ala Pro	
245 250 255	
ACG CTC AGT CAG TAC GCC GCC CTT GAG GCT TTT GAT TAC GAG TAT TTG	816
Thr Leu Ser Gln Tyr Ala Ala Leu Glu Ala Phe Asp Tyr Glu Tyr Leu	
260 265 270	
GAG AAG GTA AGA AAA ACC TTT GAA GAG AGG AGG AAC TTC CTT TAT GGG	864
Glu Lys Val Arg Lys Thr Phe Glu Glu Arg Arg Asn Phe Leu Tyr Gly	
275 280 285	
GAA CTG AAA AAA CTC TTC AAG ATA GAC GCG AAA CCT CAG GGA GCT TTT	912
Glu Leu Lys Lys Leu Phe Lys Ile Asp Ala Lys Pro Gln Gly Ala Phe	
290 295 300	
TAC GTA TGG GCA AAC ATA AGT GAT TAC TCC ACA GAT AGC TAC GAA TTT	960
Tyr Val Trp Ala Asn Ile Ser Asp Tyr Ser Thr Asp Ser Tyr Glu Phe	
305 310 315 320	
GCT TTA AAA CTT TTA AGG GAG GCG AGG GTG GCG GTA ACG CCC GGG GTG	1008
Ala Leu Lys Leu Leu Arg Glu Ala Arg Val Ala Val Thr Pro Gly Val	
325 330 335	
GAC TTT GGA AAA AAC AAA ACG AAG GAG TAT ATA AGG TTT GCT TAT ACG	1056
Asp Phe Gly Lys Asn Lys Thr Lys Glu Tyr Ile Arg Phe Ala Tyr Thr	
340 345 350	
AGA AAG ATA GAA GAA CTT AAG GAG GGC GTT GAA AGG ATA AAG AAG TTC	1104
Arg Lys Ile Glu Glu Leu Lys Glu Gly Val Glu Arg Ile Lys Lys Phe	
355 360 365	
TTA GAG AAG CTT AGC TGA	1122
Leu Glu Lys Leu Ser End	
370	

FIGURE 3

ATG TGG GAA TTA GAC CCT AAA ACG CTC GAA AAG TGG GAC AAG GAG TAC Met Trp Glu Leu Asp Pro Lys Thr Leu Glu Lys Trp Asp Lys Glu Tyr	48
5 10 15	
TTC TGG CAT CCA TTT ACC CAG ATG AAA GTC TAC AGA GAA GAA GAA AAC Phe Trp His Pro Phe Thr Gln Met Lys Val Tyr Arg Glu Glu Glu Asn	96
20 25 30	
CTG ATA TTT GAA CGC GGA GAA GGC GTT TAC CTG TGG GAC ATA TAC GGC Leu Ile Phe Glu Arg Gly Glu Gly Val Tyr Leu Trp Asp Ile Tyr Gly	144
35 40 45	
AGG AAG TAT ATA GAT GCC ATA TCT TCC CTC TGG TGC AAC GTC CAC GGA Arg Lys Tyr Ile Asp Ala Ile Ser Ser Leu Trp Cys Asn Val His Gly	192
50 55 60	
CAT AAC CAC CCT AAA CTG AAC AAC GCA GTT ATG AAA CAG CTC TGT AAG His Asn His Pro Lys Leu Asn Asn Ala Val Met Lys Lys Gln Leu Cys Lys	240
65 70 75 80	
GTA GCT CAC ACA ACT ACT CTG GGA AGT TCC AAC GTT CCC GCC ATA CTC Val Ala His Thr Thr Thr Leu Gly Ser Ser Asn Val Pro Ala Ile Leu	288
85 90 95	
CTT GCA AAG AAG CTT GTA GAA ATT TCT CCT GAA GGA TTA AAC AAG GTC Leu Ala Lys Lys Leu Val Glu Ile Ser Pro Glu Gly Leu Asn Lys Val	336
100 105 110	
TTT TAC TCC GAA GAC GGT GCG GAA GCA GTA GAG ATA GCG ATA AAG ATG Phe Tyr Ser Glu Asp Gly Ala Glu Ala Val Glu Ile Ala Ile Lys Met	384
115 120 125	
GCT TAT CAC TAC TGG AAG AAC AAG GGA GTT AAA GGG AAA AAC GTT TTC Ala Tyr His Tyr Trp Lys Asn Lys Gly Val Lys Gly Lys Asn Val Phe	432
130 135 140	
ATA ACG CTT TCC GAA GCC TAC CAC GGG GAT ACT GTA GGA GCG GTT AGC Ile Thr Leu Ser Glu Ala Tyr His Gly Asp Thr Val Gly Ala Val Ser	480
145 150 155 160	
GTA GGG GGT ATA GAA CTC TTC CAC GGA ACT TAT AAA GAT CTC CTT TTC Val Gly Gly Ile Glu Leu Phe His Gly Thr Tyr Lys Asp Leu Leu Phe	528
165 170 175	
AAG ACT ATA AAA CTC CCA TCT CCT TAC CTG TAC TGC AAG GAA AAG TAC Lys Thr Ile Lys Leu Pro Ser Pro Tyr Leu Tyr Cys Lys Glu Lys Tyr	576
180 185 190	
GGG GAA CTC TGC CCT GAG TGC ACG GCA GAT TTA TTA AAA CAA CTG GAA Gly Glu Leu Cys Pro Glu Cys Thr Ala Asp Leu Leu Lys Gln Leu Glu	624
195 200 205	
GAT ATC CTG AAG TCG CGG GAA GAT ATC GTT GCG GTC ATT ATG GAA GCG Asp Ile Leu Lys Ser Arg Glu Asp Ile Val Ala Val Ile Met Glu Ala	672
210 215 220	
GGA ATT CAG GCA GCC GCG GGA ATG CTC CCC TTC CCT CCG GGA TTT TTG Gly Ile Gln Ala Ala Ala Gly Met Leu Pro Phe Pro Pro Gly Phe Leu	720
225 230 235 240	

[illegible]

FIGURE 4

ATG ACA TAC TTA ATG AAC AAT TAC GCA AGG TTG CCC GTA AAG TTT GTA Met Thr Tyr Leu Met Asn Asn Tyr Ala Arg Leu Pro Val Lys Phe Val 5 10 15	48
AGG GGA AAA GGT GTT TAC CTG TAC GAT GAG GAA GGA AAG GAG TAT CTT Arg Gly Lys Gly Val Tyr Leu Tyr Asp Glu Glu Gly Lys Glu Tyr Leu 20 25 30	96
GAC TTT GTC TCC GGT ATA GGC GTC AAC TCC CTC GGT CAC GCT TAC CCA Asp Phe Val Ser Gly Ile Gly Val Asn Ser Leu Gly His Ala Tyr Pro 35 40 45	144
AAA CTC ACA GAA GCT CTA AAA GAA CAG GTT GAG AAA CTC CTC CAC GTT Lys Leu Thr Glu Ala Leu Lys Glu Gln Val Glu Lys Leu Leu His Val 50 55 60	192
TCA AAT CTT TAC GAA AAC CCG TGG CAG GAA GAA CTG GCT CAC AAA CTT Ser Asn Leu Tyr Glu Asn Pro Trp Gln Glu Glu Leu Ala His Lys Leu 65 70 75 80	240
GTA AAA CAC TTC TGG ACA GAA GGG AAG GTA TTT TTC GCA AAC AGC GGA Val Lys His Phe Trp Thr Glu Gly Lys Val Phe Phe Ala Asn Ser Gly 85 90 95	288
ACG GAA AGT GTA GAG GCG GCT ATA AAG CTC GCA AGG AAG TAC TGG AGG Thr Glu Ser Val Glu Ala Ala Ile Lys Leu Ala Arg Lys Tyr Trp Arg 100 105 110	336
GAT AAA GGA AAG AAC AAG TGG AAG TTT ATA TCC TTT GAA AAC TCT TTC Asp Lys Gly Lys Asn Lys Trp Lys Phe Ile Ser Phe Glu Asn Ser Phe 115 120 125	384
CAC GGG AGA ACC TAC GGT AGC CTC TCC GCA ACG GGA CAG CCA AAG TTC His Gly Arg Thr Tyr Gly Ser Leu Ser Ala Thr Gly Gln Pro Lys Phe 130 135 140	432
CAC AAA GGC TTT GAA CCT CTA GTT CCT GGA TTT TCT TAC GCA AAG CTG His Lys Gly Phe Glu Pro Leu Val Pro Gly Phe Ser Tyr Ala Lys Leu 145 150 155 160	480
AAC GAT ATA GAC AGC GTT TAC AAA CTC CTA GAC GAG GAA ACC GCG GGG Asn Asp Ile Asp Ser Val Tyr Lys Leu Leu Asp Glu Glu Thr Ala Gly 165 170 175	528
ATA ATT ATT GAA GTT ATA CAA GGA GAG GGC GGA GTA AAC GAG GCG AGT Ile Ile Ile Glu Val Ile Gln Gly Glu Gly Gly Val Asn Glu Ala Ser 180 185 190	576
GAG GAT TTT CTA AGT AAA CTC CAG GAA ATT TGT AAA GAA AAA GAT GTG Glu Asp Phe Leu Ser Lys Leu Gln Glu Ile Cys Lys Glu Lys Asp Val 195 200 205	624
CTC TTA ATT ATA GAC GAA GTG CAA ACG GGA ATA GGA AGG ACC GGG GAA Leu Leu Ile Ile Asp Glu Val Gln Thr Gly Ile Gly Arg Thr Gly Glu 210 215 220	672
TTC TAC GCA TAT CAA CAC TTC AAT CTA AAA CCG GAC GTA ATT GCG CTT Phe Tyr Ala Tyr Gln His Phe Asn Leu Lys Pro Asp Val Ile Ala Leu 225 230 235 240	720

[illegible]

FIGURE 5

ATG CGG AAA CTG GCC GAG CGG GCG CAG AAA CTG AGC CCC TCT CCC ACC	48
Met Arg Lys Leu Ala Glu Arg Ala Gln Lys Leu Ser Pro Ser Pro Thr	
5 10 15	
CTC TCG GTG GAC ACC AAG GCC AAG GAG CTT TTG CGG CAG GGG GAA AGG	96
Leu Ser Val Asp Thr Lys Ala Lys Glu Leu Leu Arg Gln Gly Glu Arg	
20 25 30	
GTC ATC AAT TTC GGG GCG GGG GAG CCG GAC TTC GAT ACA CCG GAA CAC	144
Val Ile Asn Phe Gly Ala Gly Glu Pro Asp Phe Asp Thr Pro Glu His	
35 40 45	
ATC AAG GAA GCG GCG AAG CGA GCT TTA GAT CAG GGC TTC ACC AAG TAC	192
Ile Lys Glu Ala Ala Lys Arg Ala Leu Asp Gln Gly Phe Thr Lys Tyr	
50 55 60	
ACG CCG GTG GCT GGG ATC TTA CCT CTT CGG GAG GCC ATA TGC GAG AAG	240
Thr Pro Val Ala Gly Ile Leu Pro Leu Arg Glu Ala Ile Cys Glu Lys	
65 70 75 80	
CTT TAC CGC GAC AAT CAA CTG GAA TAC AGC CCG AAT GAG ATC GTG GTC	288
Leu Tyr Arg Asp Asn Gln Leu Glu Tyr Ser Pro Asn Glu Ile Val Val	
85 90 95	
TCC TGT GGC GCC AAG CAT TCT ATT TTC AAC GCT CTG CAG GTC CTC CTG	336
Ser Cys Gly Ala Lys His Ser Ile Phe Asn Ala Leu Gln Val Leu Leu	
100 105 110	
GAC CCG GGG GAC GAG GTG ATA ATC CCC GTC CCC TAC TGG ACT TCC TAT	384
Asp Pro Gly Asp Glu Val Ile Ile Pro Val Pro Tyr Trp Thr Ser Tyr	
115 120 125	
CCG GAG CAG GTG AAG CTG GCG GGA GGG GTG CCG GTT TTC GTC CCC ACC	432
Pro Glu Gln Val Lys Leu Ala Gly Gly Val Pro Val Phe Val Pro Thr	
130 135 140	
TCT CCC GAG AAC GAC TTC AAG CTC AGG CCG GAA GAT CTA CGT GCG GCT	480
Ser Pro Glu Asn Asp Phe Lys Leu Arg Pro Glu Asp Leu Arg Ala Ala	
145 150 155 160	
GTA ACC CCG CGC ACC CGC CTT TTG ATC CTC AAT TCC CCG GCC AAC CCC	528
Val Thr Pro Arg Thr Arg Leu Leu Ile Leu Asn Ser Pro Ala Asn Pro	
165 170 175	
ACA GGC ACC GTT TAC CGC CGG GAG GAA CTT ATC GGC TTA GCG GAG GTA	576
Thr Gly Thr Val Tyr Arg Arg Glu Glu Leu Ile Gly Leu Ala Glu Val	
180 185 190	
GCC CTG GAG GCC GAC CTA TGG ATC TTG TCG GAC GAG ATC TAC GAA AAG	624
Ala Leu Glu Ala Asp Leu Trp Ile Leu Ser Asp Glu Ile Tyr Glu Lys	
195 200 205	
CTG ATC TAC GAC GGG ATG GAG CAC GTG AGC ATA GCC GCG CTC GAC CCG	672
Leu Ile Tyr Asp Gly Met Glu His Val Ser Ile Ala Ala Leu Asp Pro	
210 215 220	
GAG GTC AAA AAG CGC ACG ATT GTG GTA AAC GGT GTT TCC AAG GCT TAC	720
Glu Val Lys Lys Arg Thr Ile Val Val Asn Gly Val Ser Lys Ala Tyr	
225 230 235 240	

GCC ATG ACC GGT TGG CGC ATA GGT TAT GCT GCC GCT CCC CGG CCG ATA	768
Ala Met Thr Gly Trp Arg Ile Gly Tyr Ala Ala Ala Pro Arg Pro Ile	
245 250 255	
GCC CAG GCC ATG ACC AAC CTC CAA AGC CAC AGT ACC TCT AAC CCC ACT	816
Ala Gln Ala Met Thr Asn Leu Gln Ser His Ser Thr Ser Asn Pro Thr	
260 265 270	
TCC GTA GCC CAG GCG GCG GCG CTG GCC GCT CTG AAG GGG CCA CAA GAG	864
Ser Val Ala Gln Ala Ala Ala Leu Ala Ala Leu Lys Gly Pro Gln Glu	
275 280 285	
CCG GTG GAG AAC ATG CGC CGG GCT TTT CAA AAG CGG CGG GAT TTC ATC	912
Pro Val Glu Asn Met Arg Arg Ala Phe Gln Lys Arg Arg Asp Phe Ile	
290 295 300	
TGG CAG TAC CTA AAC TCC TTA CCC GGA GTG CGC TGC CCC AAA CCT TTA	960
Trp Gln Tyr Leu Asn Ser Leu Pro Gly Val Arg Cys Pro Lys Pro Leu	
305 310 315 320	
GGG GCC TTT TAC GTC TTT CCA GAA GTT GAG CGG GCT TTT GGG CCG CCG	1008
Gly Ala Phe Tyr Val Phe Pro Glu Val Glu Arg Ala Phe Gly Pro Pro	
325 330 335	
TCT AAA AGG ACG GGA AAT ACT ACC GCT AGC GAC CTG GCC CTT TTC CTC	1056
Ser Lys Arg Thr Gly Asn Thr Thr Ala Ser Asp Leu Ala Leu Phe Leu	
340 345 350	
CTG GAA GAG ATA AAA GTG GCC ACC GTG GCT GGG GCT GCC TTT GGG GAC	1104
Leu Glu Glu Ile Lys Val Ala Thr Val Ala Gly Ala Ala Phe Gly Asp	
355 360 365	
GAT CGC TAC CTG CGC TTT TCC TAC GCC CTG CGG CTG GAA GAT ATC GAA	1152
Asp Arg Tyr Leu Arg Phe Ser Tyr Ala Leu Arg Leu Glu Asp Ile Glu	
370 375 380	
GAG GGG ATG CAA CGG TTT AAA GAA TTG ATC GAA GCG GCA CTT TAA	1197
Glu Gly Met Gln Arg Phe Lys Glu Leu Ile Glu Ala Ala Leu End	
385 390 395	

FIGURE 6

ATG TGC GGG ATA GTC GGA TAC GTA GGG AGG GAT TTA GCC CTT CCT ATA	48
Met Cys Gly Ile Val Gly Tyr Val Gly Arg Asp Leu Ala Leu Pro Ile	
5 10 15	
GTC CTC GGA GCT CTT GAG AGA CTC GAA TAC AGG GGT TAC GAC TCC GCG	96
Val Leu Gly Ala Leu Glu Arg Leu Glu Tyr Arg Gly Tyr Asp Ser Ala	
20 25 30	
GGA GTT GCC CTT ATA GAA GAC GGG AAA CTC ATA GTT GAA AAG AAG AAG	144
Gly Val Ala Leu Ile Glu Asp Gly Lys Leu Ile Val Glu Lys Lys Lys	
35 40 45	
GGA AAG ATA AGG GAA CTC GTT AAA GCG CTA TGG GGA AAG GAT TAC AAG	192
Gly Lys Ile Arg Glu Leu Val Lys Ala Leu Trp Gly Lys Asp Tyr Lys	
50 55 60	
GCT AAA ACG GGT ATA GGT CAC ACA CGC TGG GCA ACC CAC GGA AAG CCC	240
Ala Lys Thr Gly Ile Gly His Thr Arg Trp Ala Thr His Gly Lys Pro	
65 70 75 80	
ACG GAC GAG AAC GCC CAC CCC CAC ACC GAC GAA AAA GGT GAG TTT GCA	288
Thr Asp Glu Asn Ala His Pro His Thr Asp Glu Lys Gly Glu Phe Ala	
85 90 95	
GTA GTT CAC AAC GGG ATA ATA GAA AAC TAC TTA GAA CTA AAA GAG GAA	336
Val Val His Asn Gly Ile Ile Glu Asn Tyr Leu Glu Leu Lys Glu Glu	
100 105 110	
CTA AAG AAG GAA GGT GTA AAG TTC AGG TCC GAA ACA GAC ACA GAA GTT	384
Leu Lys Lys Glu Gly Val Lys Phe Arg Ser Glu Thr Asp Thr Glu Val	
115 120 125	
ATA GCC CAC CTC ATA GCG AAG AAC TAC AGG GGG GAC TTA CTG GAG GCC	432
Ile Ala His Leu Ile Ala Lys Asn Tyr Arg Gly Asp Leu Leu Glu Ala	
130 135 140	
GTT TTA AAA ACC GTA AAG AAA TTA AAG GGT GCT TTT GCC TTT GCG GTT	480
Val Leu Lys Thr Val Lys Lys Leu Lys Gly Ala Phe Ala Phe Ala Val	
145 150 155 160	
ATA ACG GTT CAC GAA CCA AAC AGA CTA ATA GGA GTG AAG CAG GGG AGT	528
Ile Thr Val His Glu Pro Asn Arg Leu Ile Gly Val Lys Gln Gly Ser	
165 170 175	
CCT TTA ATC GTC GGA CTC GGA GAA GGA GAA AAC TTC CTC GCT TCA GAT	576
Pro Leu Ile Val Gly Leu Gly Glu Gly Glu Asn Phe Leu Ala Ser Asp	
180 185 190	
ATT CCC GCA ATA CTT CCT TAC ACG AAA AAG ATT ATT GTT CTT GAT GAC	624
Ile Pro Ala Ile Leu Pro Tyr Thr Lys Lys Ile Ile Val Leu Asp Asp	
195 200 205	
GGG GAA ATA GCG GAC CTG ACT CCC GAC ACT GTG AAC ATT TAC AAC TTT	672
Gly Glu Ile Ala Asp Leu Thr Pro Asp Thr Val Asn Ile Tyr Asn Phe	
210 215 220	
GAG GGA GAG CCC GTT TCA AAG GAA GTA ATG ATT ACG CCC TGG GAT CTT	720
Glu Gly Glu Pro Val Ser Lys Glu Val Met Ile Thr Pro Trp Asp Leu	
225 230 235 240	

GTT TCT GCG GAA AAG GGT GGT TTT AAA CAC TTC ATG CTA AAA GAG ATA Val Ser Ala Glu Lys Gly Gly Phe Lys His Phe Met Leu Lys Glu Ile 245 250 255	768
TAC GAA CAG CCC AAA GCC ATA AAC GAC ACA CTC AAG GGT TTC CTC TCA Tyr Glu Gln Pro Lys Ala Ile Asn Asp Thr Leu Lys Gly Phe Leu Ser 260 265 270	816
ACC GAA GAC GCA ATA CCC TTT AAG TTA AAA GAC TTC AGA AGG GTT TTA Thr Glu Asp Ala Ile Pro Phe Lys Leu Lys Asp Phe Arg Arg Val Leu 275 280 285	864
ATA ATA GCG TGC GGG ACC TCT TAC CAC GCG GGC TTC GTC GGA AAG TAC Ile Ile Ala Cys Gly Thr Ser Tyr His Ala Gly Phe Val Gly Lys Tyr 290 295 300	912
TGG ATA GAG AGA TTT GCA GGT GTT CCC ACA GAG GTA ATT TAC GCT TCG Trp Ile Glu Arg Phe Ala Gly Val Pro Thr Ser Val Ile Tyr Ala Ser 305 310 315 320	960
GAA TTC AGG TAT GCG GAC GTT CCC GTT TCG GAC AAG GAT ATC GTT ATC Glu Phe Arg Tyr Ala Asp Val Pro Val Ser Asp Lys Asp Ile Val Ile 325 330 335	1008
GGA ATT TCC CAG TCA GGA GAG ACC GCT GAC ACA AAG TTT GCC CTT CAG Gly Ile Ser Gln Ser Gly Glu Thr Ala Asp Thr Lys Phe Ala Leu Gln 340 345 350	1056
TCC GCA AAG GAA AAG GGA GCC TTT ACC GTG GGA CTC GTA AAC GTA GTG Ser Ala Lys Glu Lys Gly Ala Phe Thr Val Gly Leu Val Asn Val Val 355 360 365	1104
GGA AGT GCC ATA GAC AGG GAG TCG GAC TTT TCC CTT CAC ACA CAT GCG Gly Ser Ala Ile Asp Arg Glu Ser Asp Phe Ser Leu His Thr His Ala 370 375 380	1152
GGA CCC GAA ATA GGC GTG GCG GCT ACA AAG ACC TTC ACC GCA CAG TTC Gly Pro Glu Ile Gly Val Ala Ala Thr Lys Thr Phe Thr Ala Gln Phe 385 390 395 400	1200
ACC GCA CTC TAC GCC CTT TCG GTA AGG GAA AGT GAG GAG AGG GAA AAT Thr Ala Leu Tyr Ala Leu Ser Val Arg Glu Ser Glu Glu Arg Glu Asn 405 410 415	1248
CTA ATA AGA CTC CTT GAA AAG GTT CCA TCA CTC GTT GAA CAA ACA CTG Leu Ile Arg Leu Leu Glu Lys Val Pro Ser Leu Val Glu Gln Thr Leu 420 425 430	1296
AAC ACC GCA GAA GAA GTG GAG AAG GTA GCG GAA AAG TAC ATG AAA AAG Asn Thr Ala Glu Glu Val Glu Lys Val Ala Glu Lys Tyr Met Lys Lys 435 440 445	1344
AAA AAC ATG CTT TAC CTC GGA AGG TAC TTA AAT TAC CCC ATA GCG CTG Lys Asn Met Leu Tyr Leu Gly Arg Tyr Leu Asn Tyr Pro Ile Ala Leu 450 455 460	1392
GAG GGA GCT CTT AAA CTT AAA GAA ATT TCT TAC ATA CAC GCG GAA GGT Glu Gly Ala Leu Lys Leu Lys Glu Ile Ser Tyr Ile His Ala Glu Gly 465 470 475 480	1440
TAT CCC GCA GGG GAG ATG AAG CAC GGT CCC ATA GCC CTC ATA GAC GAA Tyr Pro Ala Gly Glu Met Lys His Gly Pro Ile Ala Leu Ile Asp Glu 485 490 495	1488

65000 45000

AAC ATG CCG GTT GTG GTA ATC GCA CCG AAA GAC AGG GTT TAC GAG AAG	1536
Asn Met Pro Val Val Val Ile Ala Pro Lys Asp Arg Val Tyr Glu Lys	
500 505 510	
ATA CTC TCA AAC GTA GAA GAG GTT CTC GCA AGA AAG GGA AGG GTT ATT	1584
Ile Leu Ser Asn Val Glu Glu Val Leu Ala Arg Lys Gly Arg Val Ile	
515 520 525	
TCT GTA GGC TTT AAA GGA GAC GAA ACT CTC AAA AGC AAA TCC GAG AGC	1632
Ser Val Gly Phe Lys Gly Asp Glu Thr Leu Lys Ser Lys Ser Glu Ser	
530 535 540	
GTT ATG GAA ATC CCG AAG GCA GAA GAA CCG ATA ACT CCT TTC TTG ACG	1680
Val Met Glu Ile Pro Lys Ala Glu Glu Pro Ile Thr Pro Phe Leu Thr	
545 550 555 560	
GTA ATA CCC CTG CAA CTC TTT GCC TAC TTT ATA GCG AGC AAA CTG GGA	1728
Val Ile Pro Leu Gln Leu Phe Ala Tyr Phe Ile Ala Ser Lys Leu Gly	
565 570 575	
580	
CTG GAT GTG GAT CAG CCG AGA AAT CTC GCC AAA ACG GTC ACG GTG GAA	1776
Leu Asp Val Asp Gln Pro Arg Asn Leu Ala Lys Thr Val Thr Val Glu	
580 585 590	
TAA	1779
End	

662227 22222222

FIGURE 7

ATG ATA CCC CAG AGG ATT AAG GAA CTT GAA GCT TAC AAG ACG GAG GTC Met Ile Pro Gln Arg Ile Lys Glu Leu Glu Ala Tyr Lys Thr Glu Val	48
5 10 15	
ACT CCC GCC TCC GTC AGG CTT TCC TCT AAC GAA TTC CCC TAC GAC TTT Thr Pro Ala Ser Val Arg Leu Ser Ser Asn Glu Phe Pro Tyr Asp Phe	96
20 25 30	
CCC GAG GAG ATA AAA CAA AGG GCC TTA GAA GAA TTA AAA AAG GTT CCC Pro Glu Glu Ile Lys Gln Arg Ala Leu Glu Glu Leu Lys Lys Val Pro	144
35 40 45	
TTG AAC AAA TAC CCA GAC CCC GAA GCG AAA GAG TTA AAA GCG GTT CTT Leu Asn Lys Tyr Pro Asp Pro Glu Ala Lys Glu Leu Lys Ala Val Leu	192
50 55 60	
GCG GAT TTT TTC GGC GTT AAG GAA GAA AAT TTA GTT CTC GGT AAC GGT Ala Asp Phe Phe Gly Val Lys Glu Glu Asn Leu Val Leu Gly Asn Gly	240
65 70 75 80	
TCG GAC GAA CTC ATA TAC TAC CTC TCA ATA GCT ATA GGT GAA CTT TAC Ser Asp Glu Leu Ile Tyr Tyr Leu Ser Ile Ala Ile Gly Glu Leu Tyr	288
85 90 95	
ATA CCC GTT TAC ATA CCT GTT CCC ACC TTT CCC ATG TAC GAG ATA AGT Ile Pro Val Tyr Ile Pro Val Pro Thr Phe Pro Met Tyr Glu Ile Ser	336
100 105 110	
GCG AAA GTT CTC GGA AGA CCC CTC GTA AAG GTT CAA CTG GAC GAA AAC Ala Lys Val Leu Gly Arg Pro Leu Val Lys Val Gln Leu Asp Glu Asn	384
115 120 125	
TTT GAT ATA GAC TTA GAA AGA AGT ATT GAA TTA ATA GAG AAA GAA AAA Phe Asp Ile Asp Leu Glu Arg Ser Ile Glu Leu Ile Glu Lys Glu Lys	432
130 135 140	
CCC GTT CTC GGG TAC TTT GCT TAC CCA AAC AAC CCC ACG GGA AAC CTC Pro Val Leu Gly Tyr Phe Ala Tyr Pro Asn Asn Pro Thr Gly Asn Leu	480
145 150 155 160	
TTT TCC AGG GGA AAG ATT GAG GAG ATA AGA AAC AGG GGT GTT TTC TGT Phe Ser Arg Gly Lys Ile Glu Glu Ile Arg Asn Arg Gly Val Phe Cys	528
165 170 175	
GTA ATA GAC GAA GCC TAC TAT CAT TAC TCC GGA GAA ACC TTT CTG GAA Val Ile Asp Glu Ala Tyr Tyr His Tyr Ser Gly Glu Thr Phe Leu Glu	576
180 185 190	
GAC GCG CTC AAA AGG GAA GAT ACG GTA GTT TTG AGG ACA CTT TCA AAA Asp Ala Leu Lys Arg Glu Asp Thr Val Val Leu Arg Thr Leu Ser Lys	624
195 200 205	
ATC GGT ATG GCG AGT TTA AGG GTA GGG ATT TTA ATA GGG AAG GGG GAA Ile Gly Met Ala Ser Leu Arg Val Gly Ile Leu Ile Gly Lys Gly Glu	672
210 215 220	
ATC GTC TCA GAA ATT AAC AAG GTG AGA CTC CCC TTC AAC GTG ACC TAC Ile Val Ser Glu Ile Asn Lys Val Arg Leu Pro Phe Asn Val Thr Tyr	720
225 230 235 240	

[illegible]

FIGURE 8

ATG AAG CCG TAC GCT AAA TAT ATC TGG CTT GAC GGC AGA ATA CTT AAG Met Lys Pro Tyr Ala Lys Tyr Ile Trp Leu Asp Gly Arg Ile Leu Lys 5 10 15	48
TGG GAA GAC GCG AAA ATA CAC GTG TTG ACT CAC GCG CTT CAC TAC GGA Trp Glu Asp Ala Lys Ile His Val Leu Thr His Ala Leu His Tyr Gly 20 25 30	96
ACC TCT ATA TTC GAG GGA ATA AGA GGG TAT TGG AAC GGC GAT AAT TTG Thr Ser Ile Phe Glu Gly Ile Arg Gly Tyr Trp Asn Gly Asp Asn Leu 35 40 45	144
CTC GTC TTT AGG TTA GAA GAA CAC ATC GAC CGC ATG TAC AGA TCG GCT Leu Val Phe Arg Leu Glu Glu His Ile Asp Arg Met Tyr Arg Ser Ala 50 55 60	192
AAG ATA CTA GGC ATA AAT ATT CCG TAT ACA AGA GAG GAA GTC CGC CAA Lys Ile Leu Gly Ile Asn Ile Pro Tyr Thr Arg Glu Glu Val Arg Gln 65 70 75 80	240
GCT GTA CTA GAG ACC ATA AAG GCT AAT AAC TTC CGA GAG GAT GTC TAC Ala Val Leu Glu Thr Ile Lys Ala Asn Asn Phe Arg Glu Asp Val Tyr 85 90 95	288
ATA AGA CCT GTG GCG TTT GTC GCC TCG CAG ACG GTG ACG CTT GAC ATA Ile Arg Pro Val Ala Phe Val Ala Ser Gln Thr Val Thr Leu Asp Ile 100 105 110	336
AGA AAT TTG GAA GTC TCC CTC GCG GTT ATT GTA TTC CCA TTT GGC AAA Arg Asn Leu Glu Val Ser Leu Ala Val Ile Val Phe Pro Phe Gly Lys 115 120 125	384
TAC CTC TCG CCC AAC GGC ATT AAG GCA ACG ATT GTA AGC TGG CGT AGA Tyr Leu Ser Pro Asn Gly Ile Lys Ala Thr Ile Val Ser Trp Arg Arg 130 135 140	432
GTA CAT AAT ACA ATG CTC CCT GTG ATG GCA AAA ATC GGC GGT ATA TAT Val His Asn Thr Met Leu Pro Val Met Ala Lys Ile Gly Gly Ile Tyr 145 150 155 160	480
GTA AAC TCT GTA CTT GCG CTT GTA GAG GCT AGA AGC AGG GGA TTT GAC Val Asn Ser Val Leu Ala Leu Val Glu Ala Arg Ser Arg Gly Phe Asp 165 170 175	528
GAG GCT TTA TTA ATG GAC GTT AAC GGT TAT GTT GTT GAG GGT TCT GGA Glu Ala Leu Leu Met Asp Val Asn Gly Tyr Val Val Glu Gly Ser Gly 180 185 190	576
GAG AAT ATT TTC ATT GTC AGA GGT GGA AGG CTT TTC ACG CCG CCA GTA Glu Asn Ile Phe Ile Val Arg Gly Gly Arg Leu Phe Thr Pro Pro Val 195 200 205	624
CAC GAA TCT ATC CTC GAG GGA ATT ACG AGG GAT ACG GTA ATA AAG CTC His Glu Ser Ile Leu Glu Gly Ile Thr Arg Asp Thr Val Ile Lys Leu 210 215 220	672
AGC GGG GAT GTG GGA CTT CGG GTG GAG GAA AAG CCT ATT ACG AGG GAG Ser Gly Asp Val Gly Leu Arg Val Glu Glu Lys Pro Ile Thr Arg Glu 225 230 235 240	720

GAG GTG TAT ACA GCC GAC GAG GTG TTT TTA GTA GGA ACC GCC GCA GAG	768
Glu Val Tyr Thr Ala Asp Glu Val Phe Leu Val Gly Thr Ala Ala Glu	
245 250 255	
ATA ACG CCA GTG GTG GAG GTT GAC GGC AGA ACA ATC GGC ACA GGC AAG	816
Ile Thr Pro Val Val Glu Val Asp Gly Arg Thr Ile Gly Thr Gly Lys	
260 265 270	
CCG GGC CCC ATT ACG ACA AAA ATA GCT GAG CTG TAC TCA AAC GTC GTG	864
Pro Gly Pro Ile Thr Thr Lys Ile Ala Glu Leu Tyr Ser Asn Val Val	
275 280 285	
AGA GGC AAA GTA GAG AAA TAC TTA AAT TGG ATC ACT CCT GTG TAT TAG	912
Arg Gly Lys Val Glu Lys Tyr Leu Asn Trp Ile Thr Pro Val Tyr End	
290 295 300	

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FIGURE 9

Ammonifex degensii histidinol phosphate aminotransferase

1 ATG GCA GTC AAA GTG CGG CCT GAG CTC AGC CAG GTG GAG ATC TAC CGT CCC GGC AAA CCC 60 35
 1 Met Ala Val Lys Val Arg Pro Glu Leu Ser Gln Val Glu Ile Tyr Arg Pro Gly Lys Pro 20 36

61 ATC GAA GAG GTA AAG AAG GAG CTG GGG CTG GAG GAG GTA GTC AAG CTG GCC TCC AAC GAG 120
 21 Ile Glu Glu Val Lys Lys Glu Leu Gly Leu Glu Glu Val Val Lys Leu Ala Ser Asn Glu 40

121 AAC CCT CTG GGA CCT TCT CCC AAG GCC GTG GCG GCG CTG GAG GGA CTG GAC CAC TGG CAC 180
 41 Asn Pro Leu Gly Pro Ser Pro Lys Ala Val Ala Ala Leu Glu Gly Leu Asp His Trp His 60

181 CTT TAC CCA GAA GGC TCA AGC TAT GAG CTA CGG CAG GCG CTG GGT AAG AAA CTG GAG ATA 240
 61 Leu Tyr Pro Glu Gly Ser Ser Tyr Glu Leu Arg Gln Ala Leu Gly Lys Lys Leu Glu Ile 80

241 GAC CCG GAC AGC ATC ATC GTG GGT TGC GGC TCA AGC GAA GTC ATC CAG ATG CTC TCT TTG 300
 81 Asp Pro Asp Ser Ile Ile Val Gly Cys Gly Ser Ser Glu Val Ile Gln Met Leu Ser Leu 100

301 GCC CTG CTG GCG CCC GGC GAC GAG GTG GTC ATC CCT GTG CCT ACC TTT CCC CGC TAT GAG 360
 101 Ala Leu Leu Ala Pro Gly Asp Glu Val Val Ile Pro Val Pro Thr Phe Pro Arg Tyr Glu 120

361 CCC CTG GCA CGG CTC ATG GGG GCT AAT CCC GTA AAA GTT CCC TTG AAG GAC TAC CGC ATC 420
 121 Pro Leu Ala Arg Leu Met Gly Ala Asn Pro Val Lys Val Pro Leu Lys Asp Tyr Arg Ile 140

421 GAT GTG GAG GCA GTG GCC CGA GCC CTT TCC CCC CGT ACC AAG CTG GTC TAC CTA TGC AAC 480
 141 Asp Val Glu Ala Val Ala Arg Ala Leu Ser Pro Arg Thr Lys Leu Val Tyr Leu Cys Asn 160

481 CCC AAC AAC CCC ACC GGG ACC ATC GTC ACC CGG GAG GAG GTG GAG TGG TTC TTG GAA AAG 540
 161 Pro Asn Asn Pro Thr Gly Thr Ile Val Thr Arg Glu Glu Val Glu Trp Phe Leu Glu Lys 180

541 GCG GGG GAG GGG GTT CTC ACC GTG CTG GAC GAG GCC TAC TGC GAG TAC GTG ACC AGC CCC 600
 181 Ala Gly Glu Gly Val Leu Thr Val Leu Asp Glu Ala Tyr Cys Glu Tyr Val Thr Ser Pro 200

601 GCC TAC CCT GAT GGG CTC GAT TTC CTG CGC CGG GGC TAC AAT GTG GTG GTG CTG CGC ACC 660
 201 Ala Tyr Pro Asp Gly Leu Asp Phe Leu Arg Arg Gly Tyr Asn Val Val Val Leu Arg Thr 220

661 TTC TCC AAG ATC TAC GGG CTG GCC GGG CTG CGC ATA GGG TAC GGT GTG GCG GAC AGG GAG 720
 221 Phe Ser Lys Ile Tyr Gly Leu Ala Gly Leu Arg Ile Gly Tyr Gly Val Ala Asp Arg Glu 240

721 CTG GTG GCG GAA CTG CAC CGG GTG CGG GAG CCT TTC AAT GTC AGT TCC GCT GCT CAG ATA 780
 241 Leu Val Ala Glu Leu His Arg Val Arg Glu Pro Phe Asn Val Ser Ser Ala Ala Gln Ile 260

781 GCC GCC CTG GCC GCC CTG GAA GAC GAA GAG TTC GTG GCG CTT TCG CGC CAG GTC AAC GAA 840
 261 Ala Ala Leu Ala Ala Leu Glu Asp Glu Glu Phe Val Ala Leu Ser Arg Gln Val Asn Glu 280

841 GAA GGG AAG GTT TTT CTC TAC CGA GAA CTG GAG AGG CGG GGG ATC GCC TAC GTG CCC ACC 900
 281 Glu Gly Lys Val Phe Leu Tyr Arg Glu Leu Glu Arg Arg Gly Ile Ala Tyr Val Pro Thr 300

901 GAG GCC AAC TTC CTA CTC TTC GAT GCC GGT CGG GAC GAG CAG GAA GTA TTT CGC CGG ATG 960
 301 Glu Ala Asn Phe Leu Leu Phe Asp Ala Gly Arg Asp Glu Gln Glu Val Phe Arg Arg Met 320

961 CTG CGC CAG GGA GTG ATC ATC CGG GNC GGG GTG GGT TAT CCC ACC CAC TTA AGG GTG ACC 1020
 321 Leu Arg Gln Gly Val Ile Ile Arg Xxx Gly Val Gly Tyr Pro Thr His Leu Arg Val Thr 340

1021 ATC GGC ACC TTG GAA CAG AAC CAG CGC TTC CTG GAA GCT TTG GAT AAG GCT CTA GAG CTT 1080
 341 Ile Gly Thr Leu Glu Gln Asn Gln Arg Phe Leu Glu Ala Leu Asp Lys Ala Leu Glu Leu 360

1081 AGG GGG GTT TAA 1092
 361 Arg Gly Val End 364

FIGURE 10

Aquifex aspartate aminotransferase

1 ATG AGA AAA GGA CTT GCA AGT AGG GTA AGT CAC CTA AAA CCT TCC CCC ACG CTG ACC ATA 60 39
Met Arg Lys Gly Leu Ala Ser Arg Val Ser His Leu Lys Pro Ser Pro Thr Leu Thr Ile 1/0

61 ACC GCA AAA GCA AAA GAA TTA AGG GCT AAA GGA GTG GAC GTT ATA GGT TTT GGA GCG GGA 120
Thr Ala Lys Ala Lys Glu Leu Arg Ala Lys Gly Val Asp Val Ile Gly Phe Gly Ala Gly

121 GAA CCT GAC TTC GAC ACA CCC GAC TTC ATA AAG GAA GCC TGT ATA AGG GCT TTA AGG GAA 180
Glu Pro Asp Phe Asp Thr Pro Asp Phe Ile Lys Glu Ala Cys Ile Arg Ala Leu Arg Glu

181 GGA AAG ACC AAG TAC GCT CCC TCC GCG GGA ATA CCA GAG CTC AGA GAA GCT ATA GCT GAA 240
Gly Lys Thr Lys Tyr Ala Pro Ser Ala Gly Ile Pro Glu Leu Arg Glu Ala Ile Ala Glu

241 AAA CTA CTG AAA GAA AAC AAA GTT GAG TAC AAA CCT TCA GAG ATA GTC GTT TCC GCA GGA 300
Lys Leu Leu Lys Glu Asn Lys Val Glu Tyr Lys Pro Ser Glu Ile Val Val Ser Ala Gly

301 GCG AAA ATG GTT CTC TTC CTC ATA TTC ATG GCT ATA CTG GAC GAA GGA GAC GAG GTT TTA 360
Ala Lys Met Val Leu Phe Leu Ile Phe Met Ala Ile Leu Asp Glu Gly Asp Glu Val Leu

361 CTA CCT AGC CCT TAC TGG GTA ACT TAC CCC GAA CAG ATA AGG TTC TTC GGA GGG GTT CCC 420
Leu Pro Ser Pro Tyr Trp Val Thr Tyr Pro Glu Gln Ile Arg Phe Phe Gly Gly Val Pro

421 GTT GAG GTT CCT CTA AAG AAA GAG AAA GGA TTT CAA TTA AGT CTG GAA GAT GTG AAA GAA 480
Val Glu Val Pro Leu Lys Lys Glu Lys Gly Phe Gln Leu Ser Leu Glu Asp Val Lys Glu

481 AAG GTT ACG GAG AGA ACA AAA GCT ATA GTC ATA AAC TCT CCG AAC AAC CCC ACT GGT GCT 540
Lys Val Thr Glu Arg Thr Lys Ala Ile Val Ile Asn Ser Pro Asn Asn Pro Thr Gly Ala

541 GTT TAC GAA GAG GAG GAA CTT AAG AAA ATA GCG GAG TTT TGC GTG GAG AGG GGC ATT TTC 600
Val Tyr Glu Glu Glu Glu Leu Lys Lys Ile Ala Glu Phe Cys Val Glu Arg Gly Ile Phe

601 ATA ATT TCC GAT GAG TGC TAT GAG TAC TTC GTT TAC GGT GAT GCA AAA TTT GTT AGC CCT 660
Ile Ile Ser Asp Glu Cys Tyr Glu Tyr Phe Val Tyr Gly Asp Ala Lys Phe Val Ser Pro

661 GCC TCT TTC TCG GAT GAA GTA AAG AAC ATA ACC TTC ACG GTA AAC GCC TTT TCG AAG AGC 720
Ala Ser Phe Ser Asp Glu Val Lys Asn Ile Thr Phe Thr Val Asn Ala Phe Ser Lys Ser

721 TAT TCC ATG ACT GGT TGG CGA ATA GGT TAT GTA GCG TGC CCC GAA GAG TAC GCA AAA GTG 780
Tyr Ser Met Thr Gly Trp Arg Ile Gly Tyr Val Ala Cys Pro Glu Glu Tyr Ala Lys Val

781 ATA GCG AGT CTT AAC AGC CAG AGT GTT TCC AAC GTC ACT ACC TTT GCC CAG TAT GGA GCT 840
Ile Ala Ser Leu Asn Ser Gln Ser Val Ser Asn Val Thr Thr Phe Ala Gln Tyr Gly Ala

841 CTT GAG GCC TTG AAA AAT CCA AAG TCT AAA GAT TTT GTA AAC GAA ATG AGA AAT GCT TTT 900
Leu Glu Ala Leu Lys Asn Pro Lys Ser Lys Asp Phe Val Asn Glu Met Arg Asn Ala Phe

901 GAA AGG AGA AGG GAT ACG GCT GTA GAA GAG CTT TCT AAA ATT CCA GGT ATG GAT GTG GTA 960
Glu Arg Arg Arg Asp Thr Ala Val Glu Glu Leu Ser Lys Ile Pro Gly Met Asp Val Val

961 AAA CCC GAA GGT GCC TTT TAC ATA TTT CCG GAC TTC TCC GCT TAC GCT GAG AAA CTG GGT 1020
Lys Pro Glu Gly Ala Phe Tyr Ile Phe Pro Asp Phe Ser Ala Tyr Ala Glu Lys Leu Gly

1021 GGT GAT GTG AAA CTC TCG GAG TTC CTT CTG GAA AAG GCT AAG GTT GCG GTG GTT CCC GGT 1080
Gly Asp Val Lys Leu Ser Glu Phe Leu Leu Glu Lys Ala Lys Val Ala Val Val Pro Gly

1081 TCG GCC TTC GGA GCT CCC GGA TTT TTG AGG CTT TCT TAC GCC CTT TCC GAG GAA AGA CTC 1140
Ser Ala Phe Gly Ala Pro Gly Phe Leu Arg Leu Ser Tyr Ala Leu Ser Glu Glu Arg Leu

1141 GTT GAG GGT ATA AGG AGA ATA AAG AAA GCC CTT GAA GAG ATC TAA 1185
Val Glu Gly Ile Arg Arg Ile Lys Lys Ala Leu Glu Glu Ile End

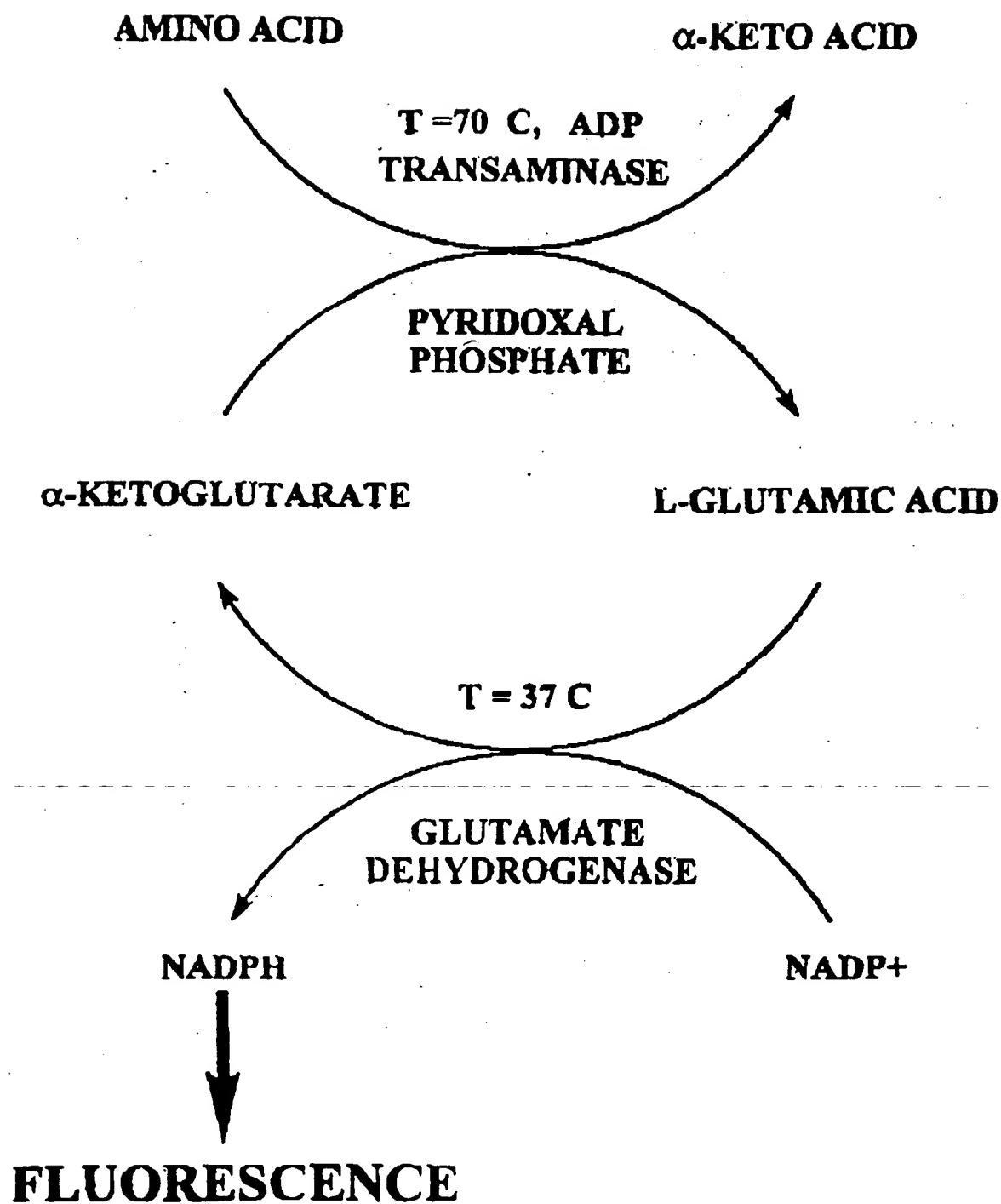


Figure 11